

What Does Climate Change Have to Do With Human Health? with John Balbus

Climate change is not just a problem for rivers and reservoirs that are running dry, or forests and grasslands that are seeing an increased incidence of wildfire, or Arctic wildlife stressed by rapidly changing ecosystems. It's a problem for human health, too, as John Balbus discusses with host Ashley Ahearn. It can be tricky to attribute specific health effects to climate change, which reflects trends in the weather averaged over decades. But short-term weather fluctuations are known to alter the risk of several diseases. As short-term fluctuations become long-term patterns, health effects also may adopt new patterns.

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AHEARN: It's *The Researcher's Perspective*. I'm Ashley Ahearn.

Climate change is not just a problem for rivers and reservoirs that are running dry or forests that are seeing more wildfires, or polar bears who are running out of frozen habitat.

It's a problem for people, and the National Institute of Environmental Health Sciences is tackling that problem. Joining me to talk about it is Dr. John Balbus. He's a senior advisor for public health at the NIEHS.

Dr. Balbus, thanks for joining me.

BALBUS: Thanks for having me.

AHEARN: Let's start with the current state of affairs. What sorts of human health impacts are we seeing now in the population that could be attributed to climate change?

BALBUS: Well, that's a good question, and it's not as easy a question to answer as you might think, and part of it has to do with this difference between climate and climate change and weather. Remember, climate is the 30-year running average of the weather,

and so to attribute actual events and human health impacts to that is a little tricky. Humans are really affected mostly by weather, so to the extent that we can attribute changes in weather to climate change, that's one way that we do it.

So if we think about climate change itself, there are some things that are going on that we're witnessing that do have human health impacts, and one of the easiest to understand is what's going on with pollen. Because of the changes in climate, the pollen season for people suffering from allergies is getting longer. There was just a study that came out in the last year that shows that the pollen season is 13 to 27 days longer,¹ and people with allergy know that the longer they're exposed to pollen, the more severe their allergies can be. People with asthma may have a higher risk of having asthma exacerbations and those kinds of things.

The World Health Organization also does an extensive and comprehensive look at causes of death around the world, and they've looked at the increase in deaths from five specific causes related to climate change, and they're looking at things like malnutrition and diarrhea, malaria, flooding, and heat stress—so not all the different things that climate change is related to, but some of the more prominent climate change related health impacts. And they've gone and, using the epidemiology studies that we have so far that try to give this idea of how much does climate change increase the risk of these conditions, they've estimated the number of people who died way back in 2000, 11 years ago, as a result of climate change, and estimated about 150,000 people died around the world because of that.²

AHEARN: What do you see as the most important or threatening human health issues associated with climate change, Dr. Balbus?

BALBUS: In the near term we're seeing a lot of problems from more extreme heat and heat stress. We know that people who have underlying lung disease have more problems when it gets very hot out, especially if that heat goes along with higher levels of ozone and other kinds of air pollution, and that can put people in the hospital because they have

trouble breathing, and their medication isn't working. We also know that people that have underlying cardiovascular disease and diabetes have problems with heat stress—both putting stress on the heart but also putting stress on the kidneys—and that when we have these bad heat waves there are a lot more people showing up with acute kidney failure because of the dehydration and the stress on the kidneys that goes with that heat. So it's going to be things like that. It's climate change as an additional stressor on top of problems that people already have with their health and the kind of problems that we already see.

AHEARN: What kind of further research do you think is needed at this point?

BALBUS: There's really been a pretty small amount of research, up to this point, on the impact of climate change on human health. We've had a pretty good body of studies that have looked at heat stress and what are the risk factors in an urban setting for problems related to heat, but we haven't even done some basic kinds of studies like looking at the impact of air pollution and how that interacts with high temperatures. When we study air pollution we tend to want to control for the weather because we're more interested in the air pollution effect, and so in the laboratory we keep the temperature at one level. In an epidemiology study we use statistical methods to control for the effects of the temperature, and so we haven't even really started to look at whether a given level of ozone exposure, for example, on a day when it's 100 degrees, is more or less harmful than a day when it's 80 degrees or 90 degrees. So that's one basic area, is just to look at the interactions of heat and air pollution.

We haven't been doing a lot of study about the emergence of infectious diseases,³ and this is, I think, a big gap. We know that unusual climate conditions are often associated with outbreaks, whether it was West Nile virus that took hold in New York during a period of extreme heat and drought and then heavy rains,⁴ [or] whether it's the hantavirus outbreaks that took place in the Four Corners region that were related to a period of extreme drought and then heavy spring rains [followed by summer heat and more drought].⁵

Other areas that are really ripe for research are the area of natural toxins. We know that things like aflatoxin that grows on peanuts is related to heavy rains and high levels of moisture [during crop maturation and storage].⁶ There's reason to think that the kind of stresses that will be placed on plant species and different kinds of food—whether that's shellfish in the ocean or agricultural crops—the stress of heat and unusual drought and rain conditions may change the levels of natural toxins that some of these species produce, which could have big health impacts. And we've seen things like this going on in the Pacific Northwest and the Alaska coast, where changes in the ecosystems there have led to changes in either bacterial toxins or toxins that the animals produce themselves.

AHEARN: Dr. Balbus, climate change has been a politically controversial subject for years. And as a governmental agency, I'm wondering, can you tell me how has the NIEHS surpassed that and gotten down to the nuts and bolts of really understanding and communicating the science of climate change and what it means for human health?

BALBUS: NIEHS, as part of the National Institutes of Health, has a system that really relies primarily on individual investigators for determining the exact nature of the grants and projects that get done, so I think that our institute is in a position to go with the science and to develop our community of researchers who will ask the kinds of questions that need to be asked and use them to inform the political debate.

AHEARN: Dr. Balbus, preparing for global climate change and protecting the people who will be affected by it is a huge undertaking. What do you hope the NIEHS contributes to this challenge?

BALBUS: So, NIEHS is contributing to the challenge in two major ways. The first is through the research that we're already funding now and the research program that we've set up. It's still a modest investment by the scale of climate change research in general, but we're putting about two and a half million dollars this year into a set of small grants.

As you say, climate change is a big undertaking, and it's going to take a lot to protect the health of people, and it's going to happen in a very local way, and so we need to do a much better job of understanding the effectiveness of the interventions that we make for heat stress and air pollution and the other kinds of stressors down at the local level. And so that's what we're trying to fund now, is studies of population vulnerability that really focus at the community level on what makes people vulnerable and what kinds of interventions work, and so that's one important contribution that we'll be feeding to the larger climate change and health adaptation enterprise.

And then the second way that we're contributing is through that kind of science translation, providing our expertise and leadership at the interagency level with the Global Change Research Program⁷ that NIEHS represents the Department of Health and Human Services on, and we're also cochairing an interagency working group on climate change and human health,⁸ which is pulling together all the different agencies that have an interest in this and coordinating our efforts and research and assessing the likely impacts, the state of the science, and putting in place adaptation measures to help protect public health.

AHEARN: Dr. Balbus, thanks so much.

BALBUS: Oh you're very welcome. Thank you, Ashley.

AHEARN: Dr. John Balbus is a senior advisor for public health at the National Institute of Environmental Health Sciences.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

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